Shoulder Injuries In Baseball Pitchers Could Be Prevented With 3-D Motion Detection System

A new 3-D motion detection system could help identify baseball pitchers who are at risk for shoulder injuries, according to a new study.

The system can be used on the field and requires only a laptop computer. Other systems that evaluate pitchers' throwing motions require cameras and other equipment and generally are confined to indoor use.

Loyola University Medical Center sports medicine surgeon Pietro Tonino, MD, is a co-author of the study, published in the journal Musculoskeletal Surgery.

In a well-rested pitcher, the humerus (upper arm bone) and the scapula (shoulder blade) move in concert – when one bone moves, the other moves with it. This is called the scapulo-humeral rhythm. But after a pitcher has been on the mound for a while, the muscles begin to tire, and the scapulo-humeral rhythm begins to deteriorate. The bones no longer move in sync, and this can lead to shoulder injuries.

Using just the naked eye, it is extremely difficult for a coach to detect subtle changes in a pitcher's scapulo-humeral rhythm. But such changes can be easily detected with a portable tracking system called the Xbus Kit®. Sensing units are positioned on the pitcher's scapula, humerus, forearm and sternum, and information is gathered from 3-D gyroscopes, 3-D magnetometers and 3-D accelerometers.

Researchers enrolled 13 Chicago-area college pitchers in the study. For each pitcher, the system tracked the scapulo-humeral rhythm three times: Before pitching, after throwing 60 pitches and 24 hours after a pitching session.

Results:

- Only two pitchers (15.5 percent) showed similar measurement at all three sessions.
- Five pitchers (38.5 percent) showed deterioration in the scapulo-humeral rhythm after pitching, but the rhythm was completely restored at 24 hours.
- Three pitchers (23 percent) showed deterioration after pitching. After 24 hours' rest, their scapulo-humeral rhythm was improved, but still not completely restored.

- Three pitchers (23 percent) showed deterioration in the scapulo-humeral rhythm after pitching, and the deterioration persisted even after 24 hours. This group appears to be the most at risk for shoulder injuries, Tonino said.

The study demonstrates the feasibility of using the portable tracking system to identify college-age pitchers who are at risk for shoulder injuries. To prevent such injuries, Tonino said at-risk pitchers could undergo strengthening exercises and physical therapy.

Tonino has surgically repaired thousands of shoulder injuries. But even the most successful surgery and rehabilitation cannot completely restore a shoulder to the full function the player had before the injury. Therefore, the best strategy is to prevent injuries, and the motion tracking system can help in that effort, Tonino said.

Tonino and colleagues next plan to test the tracking system on Little League pitchers.

Tonino, Loyola's program director of Sports Medicine, is also a professor in the Department of Orthopaedic Surgery & Rehabilitation at Loyola University Chicago Stritch School of Medicine.

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The study is titled "Motion analysis assessment of alterations in the scapulo-humeral rhythm after throwing in baseball pitchers."

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